

Information Technology Meets Engineering & Transportation Planning

Texas Department of
Transportation

Dawn Doyle

NATMEC 2002





Why STARS Exists ...

Get More From
Your Data





With the advent of new Traffic Monitoring and Pavement Design Guidelines, SHAs are urged to adapt to changing conditions, technology and information.

The bottom line is get better data and use it!





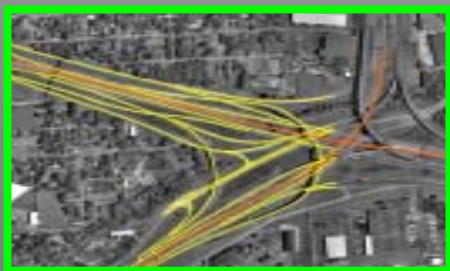
TxDOT Response

Statewide Traffic Analysis and Reporting System ... a multi-tiered client-server system to handle the counting, monitoring and analysis of Texas traffic. STARS, using a relational database management system, integrates a full suite of traffic and spatial data analysis tools designed to meet current and emerging traffic monitoring mandates and automation incorporating new technologies.





What STARS is ...



ISD - On-system only
LRS/GAIP

TPP - GIS, TRM, RI

Analysts: Analyze

- Traffic Data
- Statistics
- Engineering
- Estimations
- Projections

Axle Counts
Vehicle Classification
Volume Counts
Cont. Veh. Class.
Vehicle Weight
Vehicle Speed

Traffic Data
Oracle
RDBMS

**Software loads &
processes data!**



Web Access
for TxDOT and
external users





How STARS Will Come to Be ...

Or How to Successfully Build an
Enterprise Database System



Charles Darwin said,

“It is not the strongest of
the species that survives,
nor the most intelligent, but
those which are most
adaptable.”

STARS Forges New Ground!





Price Pritchett said,

In the Information Age we must hold ourselves personally accountable for the success of the organization. We are its brains; its energy. We represent its only ability to cope with change. If we personally don't help protect the total organization, we can't expect it to survive for long.

Getting to Yes!





Strong Partnerships

A Partnership providing project strength!





Thorough Planning

- Project Management Plan
 - Create the business imperative
 - Clearly tie into agency objectives
 - Have project goals and objectives
- Joint Planning & Application Design
- Software Requirements Specifications
- Requirements Traceability Matrix
- Task-level Project Work Plan

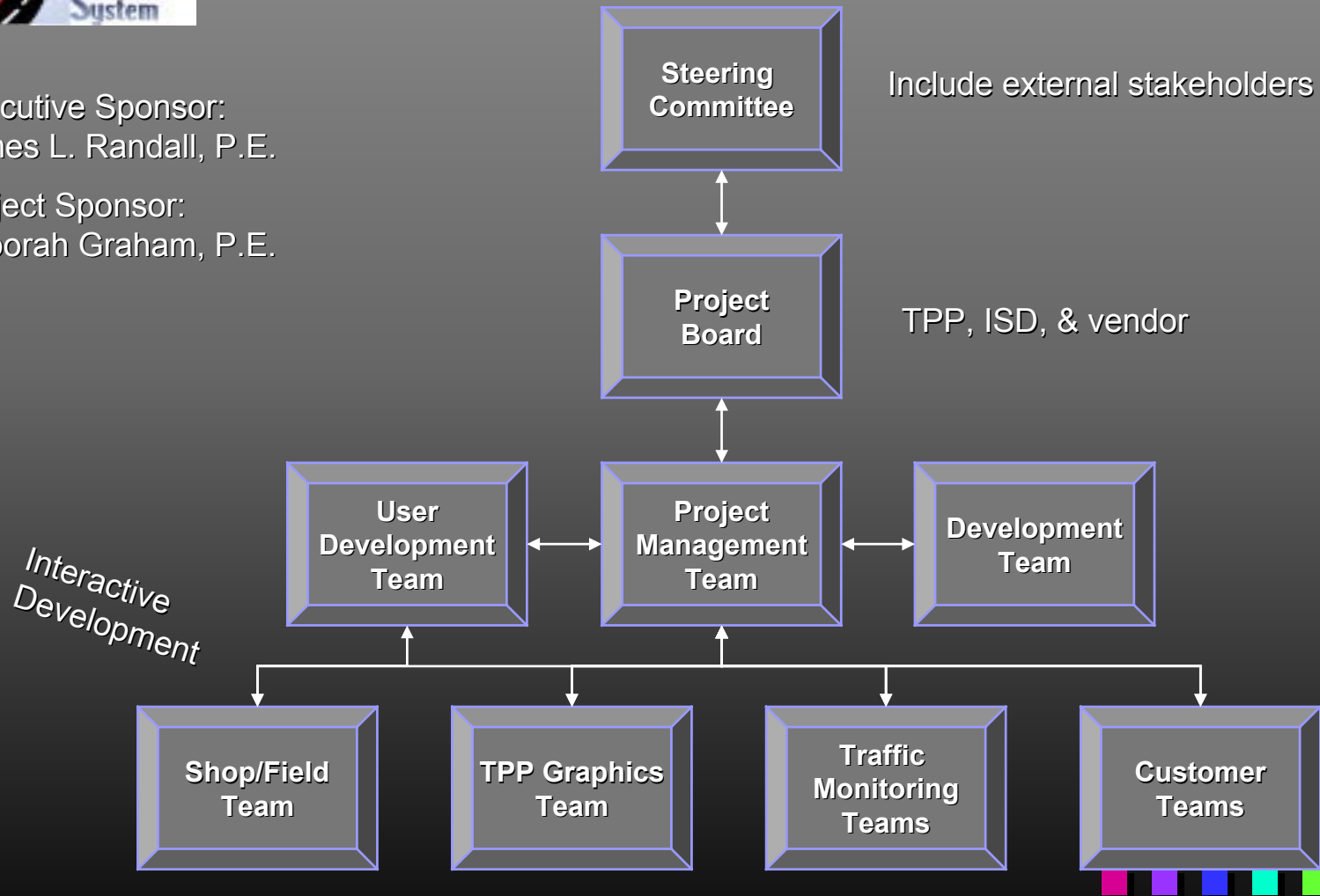




Strong Project Organization

Executive Sponsor:
James L. Randall, P.E.

Project Sponsor:
Deborah Graham, P.E.





Project Risk Mitigation

State of the practice project management

- Joint planning conducted for each deliverable with delineated tasks, check points, milestones, and performance measures
- Rigorous and continuous product review
- Vendor works on-site
- Payment only on deliverable approval





Bite-sized Releases

■ Release 1.0

- Traffic Analyst (historical, preliminary and final data)

■ Release 2.0

- Internal access; increase reporting and system functionality such as ramp balancing

■ Release 3.0

- Improve data input and sharing processes

■ Release 4.0

- External access





Information Systems Participation

■ Intensive commitment almost every step of the development process:

- Mature Process (Capability Maturity Model)
- System requirement specifications
- Project work plan
- Software development guidance & coordination/compatibility with existing IT protocols & environments
- Security
- Quality assurance processes and product review
- Intergovernmental liaison





Project Risk Mitigation

State of the practice project management

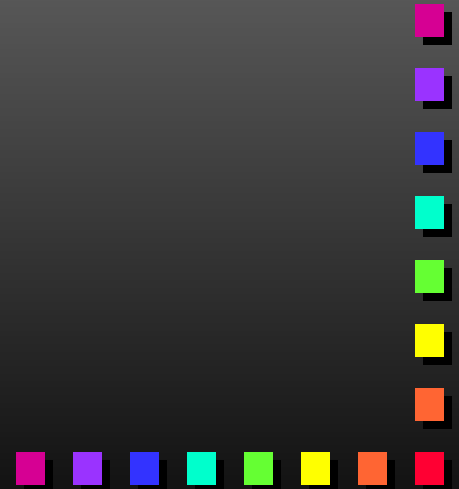
- Iterative process accommodates knowledge acquired during development
- Re-engineers nine (9) legacy data analysis programs
- Re-engineers statistical formulae used in factor development and travel estimation, etc.





Project Risk Mitigation

- Project Management
- Quality Assurance Plan
- Risk Assessment & Management Plan
- Critical Performance Criteria
- Change Control Plan
- Delineated Deliverables





Project Risk Mitigation

State of the practice project management

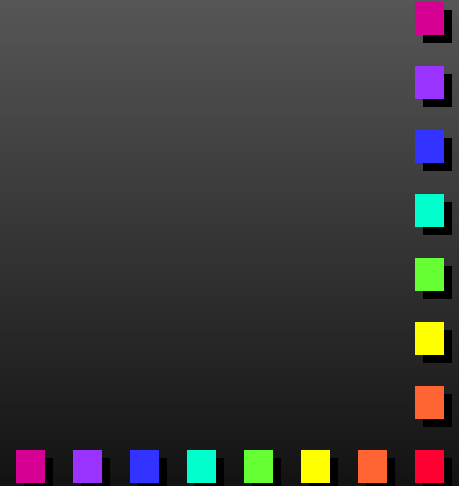
- Each Deliverable is a Mini-product
- Deliverable Planning
 - Mobilization
 - Required Skill Sets
 - Tasks
 - Check Points
 - Milestones
 - Deliverable Charter
 - Information Resource Request (time, dates)
 - Deliverable kick-off meeting





Project Risk Mitigation

- Interactive Deliverable Development
- Deliverable Review
- Deliverable Approval & Acceptance
- Deliverable Payment
- Deliverable Copyrighting





Project Risks

- Absenteeism at meetings/work sessions
- Indecision or untimely internal decisions
- Mid-course changes in standard architecture, platforms, or operating systems, etc.
- TxDOT delays in completing its tasks





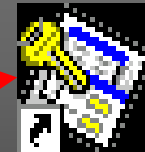
What You Get for Your Investment



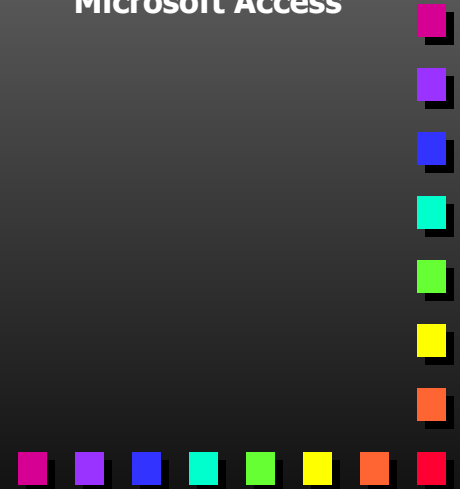
Current System



Microsoft Excel



Microsoft Access



Mainframe

Raw Data





STARS

The Future

- Automate manual processes
- Collocate data into one relational database
- Improve statistical approaches
- Meet new reporting mandates
- Better interface w/ travel demand modeling & air quality determination
- Interface w/ GIS
- Better & easier reporting
- Ad Hoc Reports
- Customized statistical analysis
- New data sources: ITS, cities, counties





Traffic Analyst

60% time savings

Axle Count Analysis

Vehicle Classification Analysis

STARS: Axle Count Analysis - Netscape

Statewide Traffic Analysis & Reporting System

Station Info | Traffic Date | 10/10/01

Current Station: 040035, Travis County, Axle Count

Analysis: Select Details, Business Dates Violated

Date	Headend	Direction	# of Aves	Axle Factor	Temporal Factor	ADT	Last Year ADT
10/10/01	Mainline	North	101,849	0.41	1.02	47,945	65,280
	Mainline	South	160,564	0.41	1.02	69,850	100,100
		Subtotal	328,495			137,343	195,280
	Frontage Road	North	322	0.46	1.04	154	15,800
	Frontage Road	South	35,338	0.45	1.03	18,229	14,800
		Subtotal	35,660			18,383	29,999
	Total		363,857			155,829	191,100

Station History

2000 Mainline ADT: 131,200 Frontage Road ADT: 39,600 Total ADT: 191,100

ADT Year:

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STARS: Vehicle Classification Data Analysis - Southeast Mainline, Viewed by Lane - Netscape

Statewide Traffic Analysis & Reporting System

Station Info | Traffic Date | 10/10/01

Current Station: 040035, Travis County, Axle Count

Analysis: Select Details, Business Dates Violated

Eastbound Mainline: Viewbound Mainline, Total, Behind By Lane

June 16, 2001 - Suspect: 1150290, Travis County, East of FM 1826, Automatic Vehicle Classification Count

Analysis: Business Dates Violated

Hour Ending	Class	Percent Trucks: 27.0%	View By Lane
10:00am	Class	30	Class
Lane 1	Class	22	Class
Lane 2	Class	8	Class
3:00am	Class	38	Class
4:00am	Class	26	Class
5:00am	Class	41	Class
6:00am	Class	125	Class
7:00am	Class	493	Class
8:00am	Class	709	Class

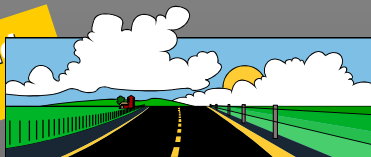




Transportation Analyst

Trade data - View maps!

Travel Demand Model



SUPPLY

Network (MPO task)

Transit Alternatives

DEMAND

Demographics (MPO task)

Traffic Counts/
Travel Survey (DOT task)



Travel Demand Model

Air Quality

Mobile 5 Model



VMT
Speed

Emissions
Factors

Urban Air Shed Model/
Photochemical Model

Emission
Concentrations

Highway
Network

Traffic
Assignment

Trip Table

Outputs include future
volumes & speeds
per roadway



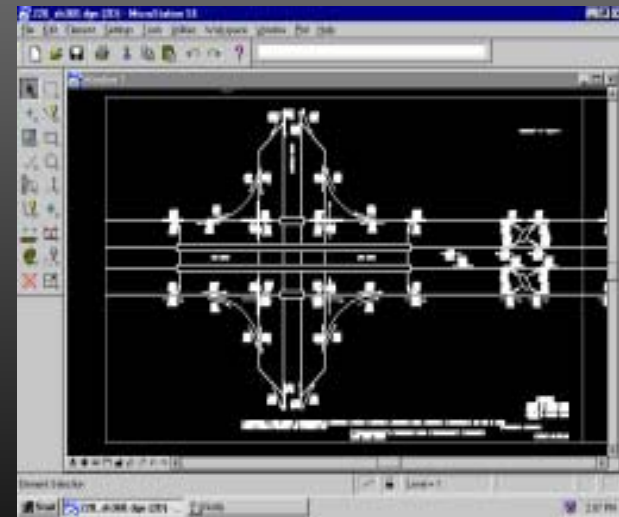
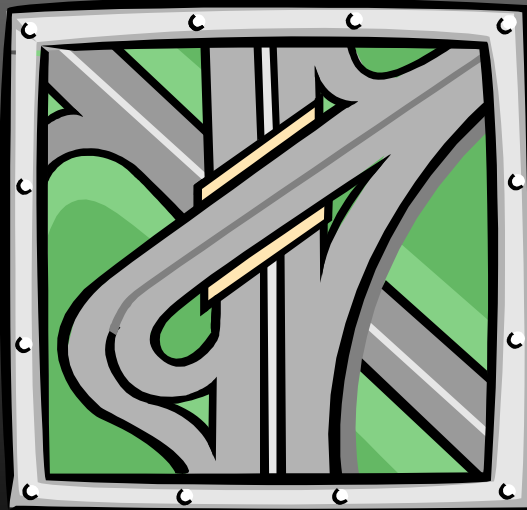
Latin American Truck
Flows 2020





TxDOT Engineers

- Engineers have more accurate, consistent and project-specific traffic data needed for highway engineering decisions

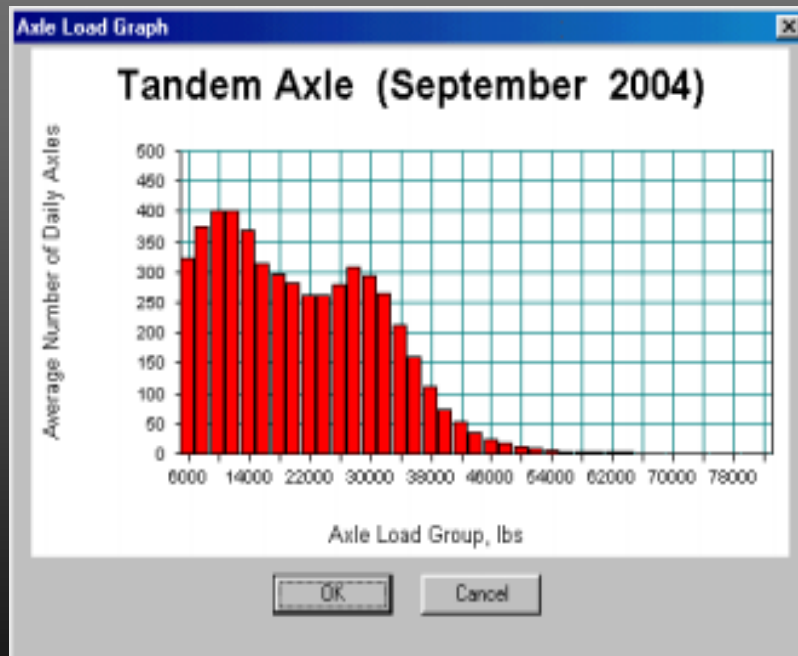




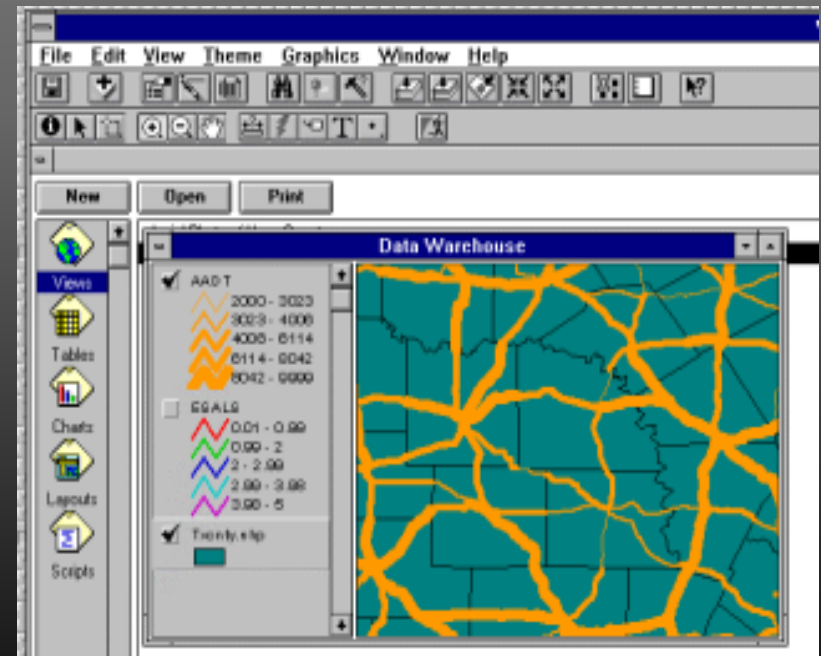
TxDOT Engineers

Accurate & Consistent Information

Axle Load Spectra



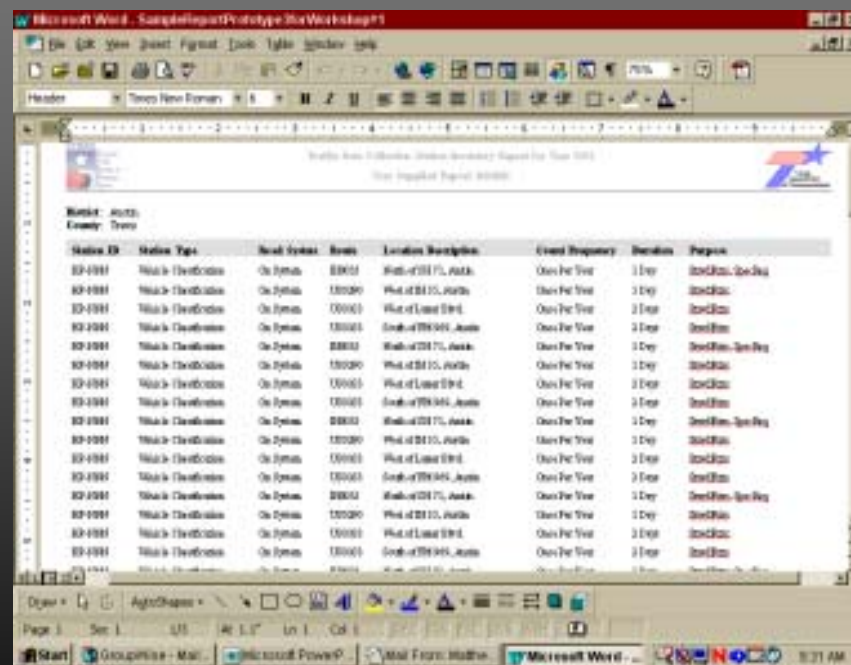
Traffic Volume Flowband Map





Cost Effective

Traffic Volume Data

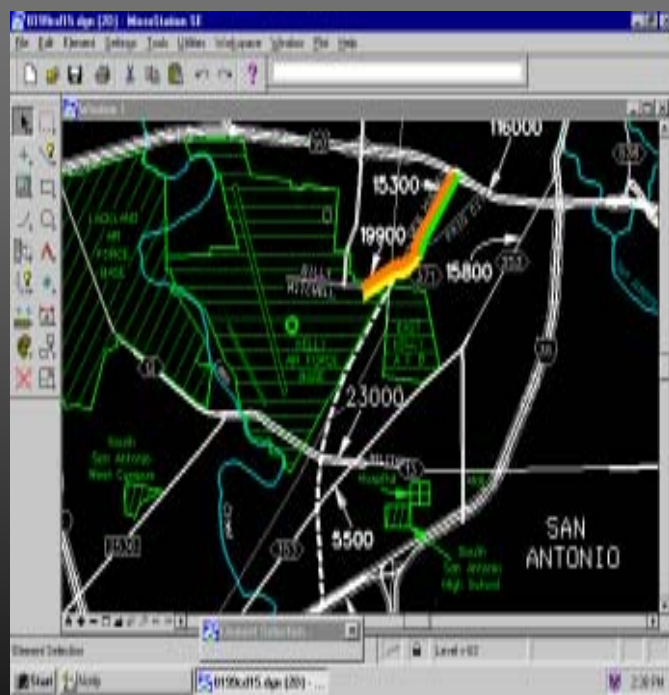




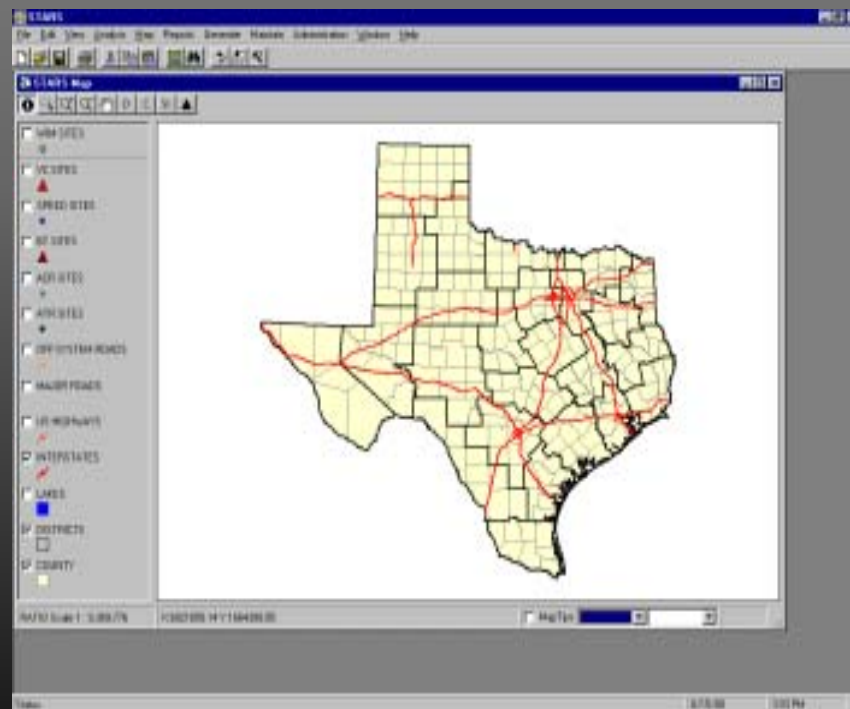
Legislators

Efficient-Help Yourself

TxDOT Construction Map



Interstate Attribute Map





How STARS Works ...





Architecture for Techies

- Web-based (XML language)
- Multi-tiered client-server
- Object-oriented
- Relational database
- ArcIMS
- Oracle 8i
- MS Windows.NET





Costs for Accountants

Start date:

10/25/99



1,930,727

**Planning & Design -
Phase I**

Start date:

08/01/00



607,000

**Added JADs, &
Risk Mgmt.**

Start date:

09/01/01



1,813,469

**Increased TxDOT
participation**

Start date:

~ 11/16/2002



5,251,561

**Construction &
Deployment -
Phase 2**



Costs to Continue

- 4-5 FTE STARS Project Office
 - Transportation Planners (ad hoc crystal reporting)
 - database administrators
 - data analysts.
- Expansion of relational database management system capability





Web Security Choices

- Users have predefined roles
- Security access is tied to the roles
- Security access defines the choices that a user sees as available on the Web screen.

- Example:

A legislator or a consultant has query rights (e.g., city) - but what appears is published data in a .pdf format

